ment is by countries alphabetically. The entries under each country are, as far as practicable, in the language of the country. At the beginning an index gives page reference to each country. At the end there is an index with a page reference to each personal entry.

The entries under each country include:

(a) Societies with their postal addresses.

(b) Institutions wholly or chiefly botanical, their addresses and departments; educational institutions having separate departments dealing with botanical teaching and research.

(c) The surname and initials of Botanists, both professional and amateur, with information as to their offices and professional qualifications, their postal addresses, and their special botanical interests."

In the index to countries some 130 countries are listed, in some there is only one name mentioned, lonely places for botanists, as in Angola, Liberia, and Zanzibar. The list of institutions and botanists in the United States requires 148 pages. Probably the list of amateur botanists is more complete for the United States than for many other countries. Some 22,000 names of individuals are listed in the book.

GEORGE T. HASTINGS

Types of Humus Layer in the Forests of Northeastern United States. By L. G. Romell and S. O. Heiberg. Ecology *12*:567–608, 1931.

The paper represents a first systematic effort of applying outside Europe the principles and method laid down by P. E. Müller in his classical studies on natural types of humus layer. It is also a contribution to the question of classification and nomenclature of forest humus layers in general. After a critical review of the different proposals of classification, the authors conclude that Müller's system fits the natural conditions best. That this holds true for American conditions is indicated especially by the flora characteristic of different types of humus layer. A fundamental point of Müllers system is that the classification applies to the entire humus layer (i.e., the top layer of soil, owing its characteristic features largely to its humus content; no matter whether this content is high or low and whether the humus is "incorporated" or not). The authors strongly op-

pose the tendency inaugurated by Ramann to classify the humus alone, which is only one constituent of the biological unit. Müller's two main types or groups are retained. They are characterized morphologically, as the Scandinavian school has always done, contrary to the tendencies in Germany, and some types with unincorporated humus are included in the mull group. Specific types listed are crumb mull, grain m., twin m., detritus m., root duff, leaf d., greasy d., and fibrous d. This list is not supposed to cover every variation possible, but is just an enumeration of conditions found to occur within the region studied sufficiently regularly and characteristically enough developed to warrant their being recognized as types. The crumb mull is the classical prototype of the mull group, inhabited by large earth worms. The types greasy and fibrous duff have been taken over from the Danish forester Juncker.

The distribution of the types within the region is discussed. Ground-water conditions seem to be a particularly important factor locally. Some plants are listed as indicators of mull and of duff. The most valuable hardwood species of the region seem to be among the mull preferring plants.

Data are presented on nitrification, pH and lime content of the different types. Contrary to European experience, nitrification was found in the laboratory within all types, even pronounced duffs, and down to a pH of 2.9 which was close to the lowest pH value encountered in any sample, whether nitrifying or not. Still, a great difference was found between the types, the mull samples being practically all nitrifying, whereas the majority of samples of pronounced duffs did not nitrify. Storage tests yielded surprisingly high values for root duff and other intermediate forms, as compared to the crumb mull, while inoculation tests gave results agreeing better with the expectations from previous experience and with the indications furnished by the vegetation. The puzzling results of the storage tests are ascribed to a "sampling effect" to be discussed in a later paper.

The main data are given in concentrated table form on eight pages. A mimeographed Appendix of 29 pages, distributed by the authors, gives descriptions of 17 chosen localities including vegetation and soil notes, Bouyoucos analyses, etc.

L. G. Romell